

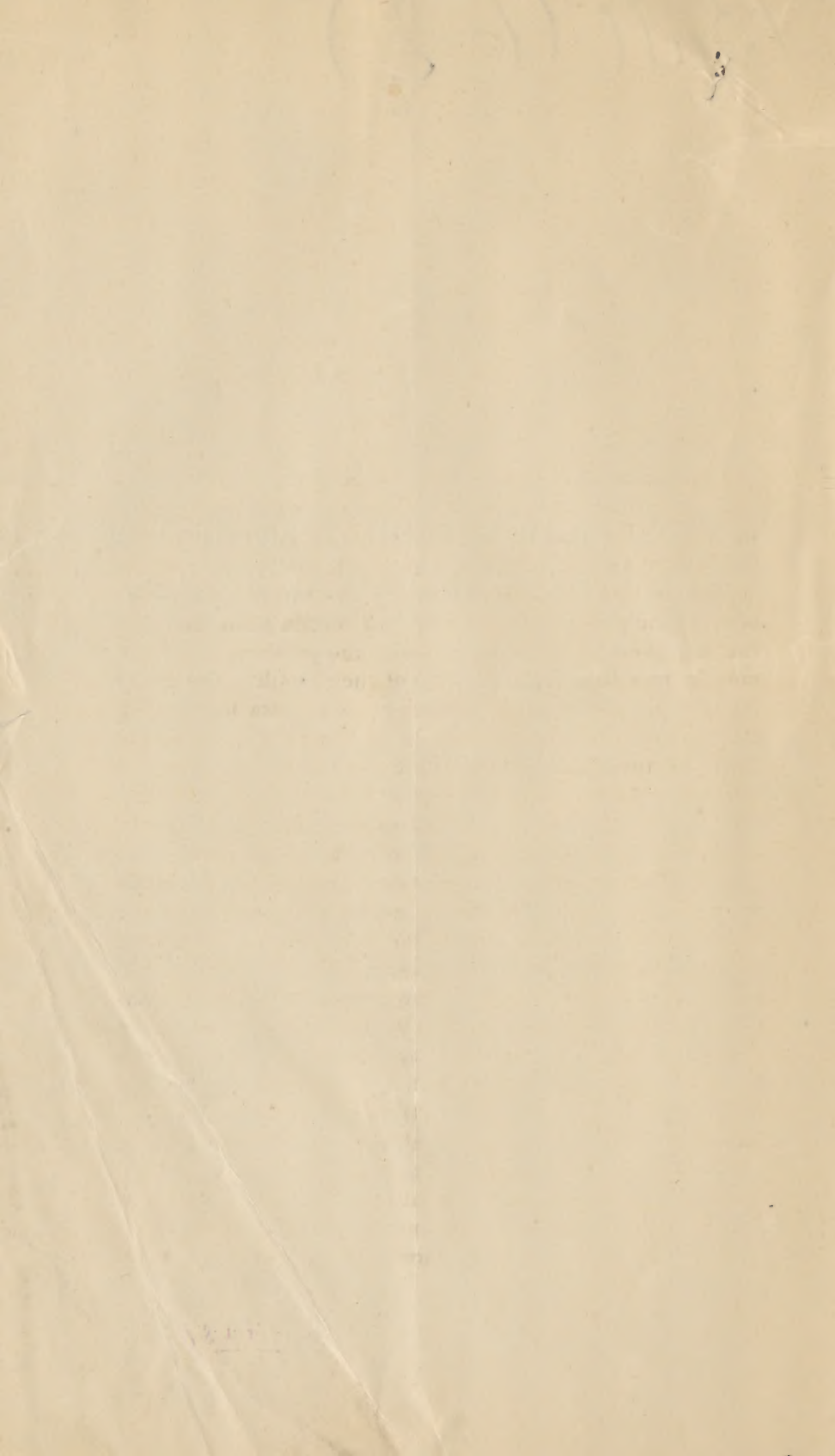
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PASSIVE MOTION IN THE TREATMENT OF
PARALYSIS OF THE OCULAR MUSCLES.

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PASSIVE MOTION IN THE TREATMENT OF PARALYSIS OF THE OCULAR MUSCLES.

THE treatment of paralysis of the ocular muscles is, even under the most favorable circumstances, unsatisfactory, and the longer the muscles have been paralyzed the more unsatisfactory are the results of treatment, whether by internal medication, or external applications, or galvanism. Many cases of syphilitic paralysis improve up to a certain point, and then the improvement stops, and though the paralyzed muscle or muscles may have regained some of their motility, the annoying diplopia still remains. Other cases are not improved at all, in spite of all the methods of treatment at our disposal. Cases of rheumatic paralysis are even more obstinate in resisting treatment, and it is in this class of cases, more than in any other, that the method of treatment first suggested by Michel in 1877, has proved in the writer's experience most useful. The influence of the galvanic current is most uncertain in producing the desired effects, mainly because it is in the nature of things almost impossible to localize or concentrate its action upon the paralyzed muscle, owing to a diffusion of a large part of the strength of the current through the overlying and surrounding tissues. By the ordinary method of application, one pole, usually a moist sponge, is placed over the closed lids, and the other pole is placed at the nape of the neck. Here a portion of the strength of the current does undoubtedly pass through the paralyzed muscle, but the greater part is diffused through the tissues of the lids and conjunctiva, and does not pass through the affected muscle. The same disadvantage attaches to the method advocated by De Wecker, in which the positive pole is placed over the supra-orbital or



infra-orbital foramen, according to the position of the muscle involved, while the negative pole, an olive-shaped electrode, is passed over the eye, the lids being closed, in the direction of the paralyzed muscle. Direct stimulation of the muscular fibres, by means of a small electrode passed through an opening made in the conjunctiva and brought directly in contact with the muscle in its sheath, produces perhaps more contractility in the muscular fibres, but always causes considerable pain and sometimes great irritation and congestion at the point of contact. Hence this method of direct stimulation of the paralyzed muscle has been given up in favor of the indirect or reflex method.

In the *Klinische Monatsblätter für Augenheilkunde* for November, 1877, Prof. Michel proposed an orthopædic method of treatment of the paralysis of the ocular muscles, which was novel in conception, and offered theoretically certain advantages. It was based on the principle of passive motion, and was very simple in execution. The paralyzed muscle is to be seized at its line of sclerotic implantation with a pair of ordinary fixation forceps, and the eyeball is then to be pulled backward and forward in the direction of the line of contraction of the affected muscle as far as possible towards or even beyond the limit of contraction, and then back in the reverse direction, as far as the limit of extreme relaxation, and these to-and-fro movements are to be continued for about two minutes. According to *Michel*, the effect produced is greatest immediately after these manipulations, and sometimes the increase in contractility amounts to a millimetre and a half. The effect gradually diminishes until, in about an hour, it corresponds to a prism of 12° to 16° in strength.

Michel states that the pain produced was trifling, and that the induced conjunctival irritation soon subsided under cold applications. He recommended a daily performance of the manœuvre, and called attention to the considerable resistance at first offered to the manœuvre by the antagonistic muscle. The advantages claimed by *Michel* for this method were: 1, Elimination of the action of the antagonistic muscle. 2, The brief duration of the treatment.

Since the appearance of *Michel's* article, the writer has tried this method of passive motion in a number of cases, and now gives the result of his experience in twenty-one (21) cases, as follows:

I.—*Paralysis of the External Rectus and Secondary Convergent Squint.* Mr. M. F., aged thirty-five. December 17, 1877. Has had homonymous diplopia for several weeks, and an examination shows paralysis of right external rectus and secondary contraction of internal rectus; also a rather marked weakness in action of both internal recti. Vision normal and fundus healthy. No history of either syphilitic infection or rheumatic tendency. Attributes the muscular paralysis to a severe cold. Internal administration of potassium iodide, and the application of the galvanic current three times a week, though persisted in, gave no result. Passive motion of the right externus daily for a minute and a half to two minutes, caused in *nine* days complete recovery. The pain caused was very severe, and the conjunctival irritation remained for several weeks after the last application.

II.—*Paralysis of the Internal Rectus.* Mrs. B., aged thirty-one. June 25, 1878. Crossed diplopia for some months. Almost complete paralysis of right internal rectus. Patient extremely rheumatic. Vision $\frac{20}{20} +$. Media and fundus normal. Refraction myopic. No trouble with the eyes until the diplopia appeared. No history of syphilis. At first a mixture of sodium salicylate and potassium iodide, combined with the galvanic current, seemed to bring about a certain improvement, but after a few weeks this ceased, and the case remained at a standstill. Passive motion daily for a period of two minutes was then instituted, and an improvement began almost immediately. At the end of the twelfth session the diplopia had entirely disappeared, and the motility was apparently restored. This patient also complained greatly of the pain, and after several of the visits there was a distinct subconjunctival hemorrhage.

III.—*Paresis of Superior Rectus and External Rectus.* Miss H. S., aged seventeen. November 29, 1878. Two weeks ago was attacked with severe pain in right eye and orbit and right side of head, and after some hours diplopia appeared

and still exists. Pain at irregular intervals. Is a tall, pale, anæmic girl, subject to rheumatism. Diplopia is homonymous and one image stands higher than the other. Vision and fundus normal. Examination showed paresis of right superior rectus and external rectus. The internal administration of tonics and the daily application of the galvanic current soon brought about a cure of the paresis of the superior rectus, but the paralysis of the external rectus remained. It was then decided to try passive motion, and the external rectus was pulled backward and forward daily for a period of one minute, which caused the patient such severe pain that after the fifth session it was deemed advisable to employ the manœuvre not oftener than every second day. This was kept up till the end of the second week, when it became necessary to stop it altogether, on account of the irritation and pain which it caused. Considerable motion, however, had been regained in the paralyzed muscle.

IV.—*Paresis of Inferior Rectus.* Mr. A. W. T., aged forty. October 7, 1880. Chancre fourteen months before, followed by cutaneous and glandular lesions, and mucous patches on tongue and in mouth and nose. Five weeks ago diplopia appeared. Examination showed paresis of right inferior rectus muscle. Vision and fundus normal. Prolonged administration of mercury and potassium iodide, together with the application of the galvanic current, failed to produce the slightest effect on the paralyzed muscle. Passive motion was then instituted with daily sessions of two minutes, which proved very painful, but also almost at once brought about an improvement in the motility of the paralyzed muscle, and at the end of the tenth session the paralysis had disappeared.

V.—*Paresis of External Rectus.* Mr. F. D. S., aged thirty-two. December 3, 1880. Is rheumatic to a marked degree. Four months ago had a severe attack of rheumatism, the result of being exposed to a severe storm, and during the attack diplopia suddenly appeared. Examination showed paresis of right external rectus. Vision and fundus normal. Potassium iodide and sodium salicylate, with the galvanic current every second day, produced considerable amelioration in the paralysis,

but after the first two weeks there was no further improvement, though the treatment was persisted in for a month. Daily passive motion was then instituted, and a further improvement began at once. After a month's treatment the motility of the eye seemed restored, though diplopia still existed at the extreme right of the field.

VI.—*Paralysis of Internal and External Rectus.* Mr. J. P. W., aged twenty-one. March 28, 1880. Has had for three years complete paralysis of left internal rectus, and partial paralysis of left external rectus. Origin unknown. Vision and fundus normal, refraction hypermetropic. Slight divergence of right eye. This patient had a long and faithful trial with the galvanic current and potassium iodide, and some improvement was produced in the motility of the external rectus, but the paralysis of the internal rectus remained complete. Passive motion of latter muscle was then begun and carried out daily for a month, but no improvement followed. This patient bore the manipulation extremely well.

VII.—*Paresis of External Rectus.* Mr. G. B. B., aged thirty-seven. April 23, 1881. Homonymous diplopia when looking to right of median line for several weeks. Partial paralysis of right external rectus. Subject to muscular rheumatism. Vision and fundus normal. No history of syphilis. Galvanism in this case proved absolutely useless, and there was no perceptible improvement from the administration of soda and potash. Three applications of passive motion on succeeding days produced a complete cure of the paresis and the disappearance of the diplopia. This patient complained greatly of the pain, and the conjunctiva remained congested for several weeks after the treatment ceased.

VIII.—*Paresis of Inferior Rectus.* Mr. J. R., aged forty-one. June 6, 1881. Chancre seven years ago; numerous constitutional symptoms since. Has had two attacks of diplopia before the present one, from both of which he entirely recovered, except that there still remains partial ptosis of right eye. Present attack of diplopia appeared one month ago, and examination shows paresis of right inferior rectus. Vision and fundus normal. The persistent administration of potassium

iodide in rapidly increasing doses and the daily application of the galvanic current proved of no avail, and the application of passive motion daily for one month proved equally futile in bringing about any improvement in the diplopia.

IX.—*Paresis of Internal Rectus.* Mr. R. H. F., aged seventeen. February 20, 1883. Crossed diplopia for three months. Paresis of right internal rectus, traced directly to exposure for hours to severe cold. Vision and fundus normal. Has had some pain in right eye and orbit. Galvanism and hot applications caused a temporary improvement, but on the tenth day the condition was as bad as when the patient was first seen. Passive motion, however, acted extremely well in this case, and at the end of the seventh application the diplopia had entirely disappeared. This patient did not complain much of the pain.

X.—*Paresis of External Rectus.* Miss C. M. C., aged eighteen. Oct. 23, 1883. Has convergent squint in left eye, following paralysis of left external rectus, of nearly two years duration, which has remained unchanged in spite of all treatment. Vision $\frac{2}{3}$, and fundus healthy. This case was deemed a very unfavorable one from the beginning, owing to the length of duration of the paralysis. There was a slight improvement in the muscular power of the external rectus during the first few sessions of the passive motion, but no subsequent improvement whatever; and after two weeks the treatment was finally discontinued.

XI.—*Paresis of External Rectus.* Mrs. J. T., aged forty-three. Nov. 30, 1883. Long subject to rheumatism. Two years ago had an alveolar abscess in upper jaw on right side, which opened both inwards and outwards through cheek. One month ago diplopia appeared. Examination shows paresis of left external rectus, and secondary contraction of left internal rectus. Vision and fundus normal. This patient had gone through a long course of anti-rheumatic treatment, including sulphur and other medicated baths, but the paralysis still remained. Eleven daily sessions of passive motion produced considerable improvement in the action of the external rectus, but the diplopia persisted even after the division of the internal rectus.

XII.—*Paralysis of External Rectus.* Miss M. K. J., aged thirty. Feb. 21, 1884. Diplopia and convergent squint in right eye, following paralysis of external rectus. Vision and fundus normal. No history of either rheumatism or syphilis. Galvanism proved of no avail, though employed for six weeks. The internal rectus muscle was then divided, and at the end of a week passive motion was begun, daily sessions of two minutes each being held. Improvement began at once, and after six applications the diplopia disappeared and did not return. There was a slight apparent divergence of the axes resulting, but no diplopia, and the internal rectus acted well.

XIII.—*Paresis of Internal Rectus.* Mr. E. J. B., aged twenty-four. Oct. 29, 1884. Had paralysis of right internal rectus nearly two years ago, with diplopia and secondary contraction of external rectus, from which he has partially recovered, but the diplopia is still annoying. Vision and fundus normal. Optic axes still divergent, but the right can be turned somewhat to the left of median line. Daily applications of passive motion for two minutes for two weeks produced a decided improvement in the power of the internal rectus, so that double images appeared only on the extreme left. No further improvement, however, was perceptible after the end of the second week, and the treatment was stopped. A still further improvement would probably have resulted from tenotomy of the external rectus, but the patient declined all operative interference.

XIV.—*Paresis of both External Recti.* Mr. L. O., aged sixteen. March 7, 1885. Convergent squint appeared in both eyes some months ago, with annoying diplopia. Both external recti muscles are partially paralyzed. The attack was preceded by pain in the eyes and orbits. Vision normal. Fundus of both eyes seem abnormally hyperæmic. This was the first case in which cocaine was employed, and the very marked relief from the usual pain was a great advantage. Daily employment of passive motion was continued for three weeks, and produced marked improvement in the motility outwards of the left eye, and to a less degree in the right eye. But the diplopia still continued, though a much less annoying degree.

There still remained a slight convergence in the right eye, but no further improvement was gained, and the treatment was given up. The galvanic current was subsequently employed every second day, and under its influence the right external rectus continued to improve in motility, but after three months slight diplopia still remained.

XV.—*Paralysis of External Rectus.* Mr. G. W. W., aged thirty. December 27, 1885. Chancre four years ago, followed by constitutional symptoms. One attack of iritis in right eye. Three months ago diplopia made its appearance and still remains. Complete paralysis of right external rectus. Vision and fundus normal. Slight convergence of right eye. Potassium iodide and mercury had previously been tried, but caused only slight temporary benefit. The potash was again essayed in large doses and pushed to toleration, but caused no appreciable improvement in the external rectus. Very decided improvement, however, followed the daily employment of passive motion for from two to three minutes, and continued for sixteen days. Here all improvement stopped, leaving still a loss of power in the externus of about 20° , and of course a corresponding diplopia. Galvanism in this case proved useless, and cocaine did not entirely relieve the pain.

XVI.—*Paresis of Inferior Rectus.* Mr. H., aged forty-nine. March 17, 1886. Is rheumatic, but denies syphilis. Eight years ago had an attack of diplopia which lasted several months. Three years ago had paralysis of left arm, from which he entirely recovered. Three months ago had a second attack of diplopia, which still exists. Vision and fundus normal. Examination shows paresis of right inferior rectus. Galvanism and sodium salicylate in large doses produced some slight improvement. Passive motion under cocaine produced absolutely no effect whatever in increasing the power of the paralyzed muscle, or in diminishing the annoying diplopia.

XVII.—*Paresis of External Rectus.* Mr. A. F. W., aged thirty-five. April 11, 1886. Diplopia appeared originally three years ago from paralysis of external rectus of right eye, and secondary convergent squint. The paresis still present, though

there has been considerable improvement. Fundus normal, refraction hypermetropic. Galvanism proved useless in this case, though faithfully carried out for six weeks. Passive motion under cocaine, employed daily, produced considerable improvement in the movements of external rectus during the first six sessions, but after this there was no further change, and the diplopia remained.

XVIII.—*Paralysis of External Rectus.* Mr. C. W. I., aged forty-eight. November 2, 1886. Long subject to rheumatism. Nine years ago, after severe attack of pain in right eye and orbit, diplopia appeared and has persisted ever since. Examination showed complete paralysis of right external rectus and secondary contraction of right internal rectus. Vision and fundus normal. Galvanism was tried faithfully, but failed to produce any effect. Passive motion daily under cocaine proved equally valueless, and after twelve applications the treatment was discontinued.

XIX.—*Paresis of External Rectus.* Mrs. T. P. K., aged thirty-five. December 7, 1886. For many years patient has not been able to turn her eyes to right side without seeing double, and she habitually carries head to right side. Examination shows paresis of right external rectus. Refraction hypermetropic and astigmatic. Tenotomy of right internal rectus and daily employment of passive motion under cocaine produced no effect whatever in improving the power of the external rectus, and after sixteen daily applications all treatment was discontinued.

XX.—*Paralysis of External Rectus.* Miss S. T., aged 19, February 2, 1887. Ill-defined homonymous diplopia for two months. Examination shows complete paralysis of right external rectus, probably as result of exposure to cold. Both corneæ cloudy from old ulcerations in childhood, and vision somewhat defective. This patient had been treated continuously with potassium iodide and the galvanic current since the appearance of the diplopia, but without any result. Daily passive motion for two minutes under cocaine produced a complete cure in nine days. This patient complained greatly of pain.

XXI.—*Paralysis of Internal Rectus.* Mr. E. K., aged twenty-seven. March 18, 1887. Diplopia and divergent

squint in right eye for more than a year. Examination shows paralysis of right internal rectus, and defective vision in right eye. Fundus normal and refraction slightly myopic. Seven daily applications of passive motion under cocaine, for two minutes each day, caused a disappearance of the diplopia and the return of the motility in the paralyzed muscle.

In considering the results of treatment by passive motion in these twenty-one cases, it will be seen that the paralysis was entirely cured in eight cases; partially relieved in six cases; while in seven cases the treatment proved valueless. This is certainly no brilliant showing, and yet the results are sufficiently favorable to make it advisable to continue our efforts in this direction. A more extended experience may perhaps teach us that passive motion in connection with the careful application of the galvanic current may give us better results than heretofore in the treatment of paralyses of the ocular muscles of long duration.

Michel reports in detail one case in which a recovery took place in five weeks. *Spalding* (Arch. of Ophthal., XV. 4) reports four cases, of which two recovered within three weeks, and two were failures. *Alt* (Amer. Jour. of Ophthal., April, 1887) reports five cases, of which three recovered and two proved failures.

The pain caused by the manipulation, when no anæsthetic is used, is in most cases severe, and is by no means entirely relieved by cocaine. The conjunctival irritation caused by the treatment is considerable, but usually transient. In several cases more or less extensive extravasation of blood took place beneath the conjunctiva, which, however, was readily absorbed. In three cases a rather pronounced œdema or chemosis of the conjunctiva followed the manipulation, but all these symptoms were transient in duration and limited to the region involved in the manœuvre. An attempt was made to substitute a pair of smooth pronged forceps, something like the ordinary epilation forceps, for the toothed fixation forceps, in order to diminish the pain and cause less laceration of the conjunctiva, but such forceps proved useless, as they failed to take hold of the muscles, and constantly slipped when traction was made.